Outbreak of Multidrug-resistant Salmonella Newport Associated with Consumption of Italian-style Soft Cheese, Connecticut

McCarthy T, Phan Q, Mshar P, Mshar R, Howard R, and Hadler J

Background: In the previous few years, multidrug-resistant Salmonella Newport (MDR-SN) has emerged in multiple states as an important cause of human illness. In Massachusetts where a sustained increase has been seen, infection with MDR-SN was associated with exposure to dairy farms. In April 2001, the Connecticut (CT) Department of Public Health (DPH) Epidemiology Program noticed through routine surveillance an increase in reports of *S*. Newport isolates and began an investigation. Initial typing by pulsed-field gel electrophoresis (PFGE) suggested that the increase was caused by a single MDR strain, indistinguishable from the Massachusetts strain.

Methods: To determine the magnitude and source of the outbreak, we reviewed previous surveillance data and conducted a case-control study and an environmental investigation. A case-patient was defined as a person reported to the DPH with illness onset April 1-25 and an isolate of the same PFGE type as the initial cases. Two or more controls for each case-patient were obtained through progressive digit-dialing matching on local prefix and age group. Environmental investigation included collecting raw milk and cheese samples from the subsequently implicated cheese manufacturer and leftover cheese from ill cheese consumers. Samples were cultured for *S*. Newport and assayed for alkaline phosphatase.

Results: Before April, only sporadic cases of *S*. Newport with a matching PFGE pattern were reported, averaging one every 2-3 months since January 2000. From April 1 through May 31, 26 MDR-SN isolates were reported. Case-patients lived in five CT counties; median age was 56 years (range: 15-88); 20 (77%) were female. Twenty-three case-patients received antibiotics for their illness. Eight cases were hospitalized, none died. The 15 case-patients included in the case-control study were more likely than their 40 controls to have consumed any of three fresh soft Italian style cheeses (100% versus 38%, $p<0.0005$). Results from consumption of basket cheese revealed the strongest association (73% versus 0%, $p<0.00001$). The implicated cheese maker obtained raw milk from a large multistate consortium. The cheese making process involved a heating step but not a formal pasteurization step. The outbreak strain was isolated from a sample of raw milk, but not cheese. Alkaline phosphatase was detected in four of eight cheese samples obtained from ill persons during the outbreak period.

Conclusions: This outbreak was most likely caused by periodic inadequate heat treatment of contaminated raw milk used to make soft cheese. Beginning the on-site cheese making process with raw milk might add an unnecessary element of risk to cheese making, particularly for fresh soft cheese. The emergence of an MDR strain of *S*. Newport as a cause of human illness associated with dairy farm contact and/or consumption of dairy products appears to be a growing problem in the U.S.

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